U.S. NUCLEAR REGULATORY COMMISSION

STANDARD REVIEW PLAN

OFFICE OF NUCLEAR REACTOR REGULATION

2.3.2 LOCAL METEOROLOGY

REVIEW RESPONSIBILITIES

Primary - Accident Evaluation Branch (AEB)Probabilistic Safety Assessment Branch (SPSB)

Secondary - None

I. AREAS OF REVIEW

For this section of the site safety assessment for an early site permit application, information Information is presented by the applicant and reviewed by the staff concerning the local (site) meteorological parameters, an assessment of the potential influence on local meteorological conditions of a nuclear power plant or plants of specified type that might be constructed on the proposed site the plant and its/their facilities on local meteorological conditions, and a topographical description of the site and its environs. The review covers the following specific areas.

1. A description of the local (site) meteorology in terms of airflow, temperature, atmospheric water vapor, precipitation, fog, atmospheric stability, and air quality.

2. An assessment of the influence on the local meteorological parameters listed in (1) of a nuclear power plant or plants of specified type that might be constructed on the proposed site ~~the plant~~ and its facilities ~~on the local meteorological parameters listed in (1)~~, including the effects of plant structures, terrain modification, and heat and moisture sources due to plant operation.

3. A topographical description of the site and its environs, as modified by the ~~plant~~ structures of a nuclear power plant or plants of specified type that might be constructed on the proposed site, including the site boundary, exclusion zone, and low population zone.

II. ACCEPTANCE CRITERIA

The information regarding the local meteorological and topographic descriptions of the site area applicable both before ~~plant~~ construction and during ~~plant~~ operation of a nuclear power plant or plants of specified type that might be constructed on the proposed site should be adequately documented such that meteorological impacts on plant design and operation as well as the impact on local meteorological conditions of the nuclear power plant or plants and its/their facilities ~~the plant~~ ~~on local meteorological conditions~~ can be reliably predicted. The information should be fully documented and substantiated as to its representativeness of conditions at and near the site. The information is acceptable if it meets the requirements of the following regulations:

1. 10 CFR Part 50, Appendix A, General Design Criterion 2 (GDC 2), "Design Bases for Protection Against Natural Phenomena," (Ref. 1) with respect to information on the most severe local weather phenomena that have historically been reported for the site and the surrounding area and that are reflected in the design bases for structures, systems, and components important to safety.

2. 10 CFR Part 100, 100.~~10(c)~~20(c) and §100.21(d) (Ref. 2) with respect to the consideration that has been given to the

local meteorological and air quality characteristics of the site and other physical characteristics of the site that can influence the local meteorology.

Specific criteria necessary to meet the requirements of GDC 2 and 10 CFR Part 100 are as follows:

1. Local summaries of meteorological data based on onsite measurements in accordance with Regulatory Guide 1.23 (Ref. 3) and National Weather Service station summaries (Refs. 4, 5) or other standard installation summaries from appropriate nearby locations should be presented as specified in Regulatory Guide 1.70, Section 2.3.2 (Ref. 6).

2. A complete topographical description of the site and environs out to a distance of 50 miles from the ~~plant~~ site, as described in Regulatory Guide 1.70, Section 2.3.2.2, should be provided (Ref. 6).

3. A discussion and evaluation of the influence on the local meteorological and air quality conditions of a nuclear power plant or plants of specified type that might be constructed on the proposed site ~~the plant~~ and its/their facilities ~~on the local meteorological and air quality conditions~~ should be provided. A discussion of potential changes in the normal and extreme values as presented in the ~~SAR~~safety assessment resulting from plant construction and operation should be made. The acceptability of the information is determined through comparison with standard assessments (Refs. 7 and 8).

III. REVIEW PROCEDURES

Section 2.3 of the ~~SAR~~safety assessment is reviewed for content based on the specifications outlined in Regulatory Guide 1.70 (Ref. 6).

1. The summaries listed in Section 2.3.2.1 of Regulatory Guide 1.70 (Ref. 6) are reviewed for completeness and adequacy of basic data. The wind and atmospheric stability data should be based on onsite data (Ref. 3), since airflow and vertical temperature structure can vary substantially from one location to another and are inputs to the assessment of atmospheric diffusion conditions at the site. The other

summaries should be based on nearby representative stations with long periods of record since the locally measured extremes in intensity and frequency are compared to design basis values presented in the ~~safety analysis report~~ safety assessment or are used by other branches to determine whether these meteorological conditions are limiting conditions for design and emergency procedures. When offsite data are used, a determination is made of how well the data represent site conditions and whether more representative data are available. National Oceanic and Atmospheric Administration (NOAA) state meteorological summaries (Ref. 4), local climatological data (Ref. 5), and NOAA ~~Environmental Data Service~~National Climatic Data Center summaries pertinent to the site are used by the reviewer to evaluate the representativeness of stations and periods of record. The reviewer should be familiar with all primary meteorological data collection locations.

2. The reviewer ensures that all topographic maps and topographic cross sections presented by the applicant are legible and well labeled so that the information needed during the review can be readily extracted. Reference points and the direction of true north should be checked carefully. Points of interest such as ~~plant~~ structures of a nuclear power plant or plants of specified type that might be constructed on the proposed site, site boundary, and exclusion zone should be marked on the maps and diagrams.

   The reviewer compares the applicant's assessment of the effect of topography to standard assessments such as those presented in "Meteorology and Atomic Energy - 1968" and "Atmospheric Science and Power Production" (Refs. 7 and 8) and decides whether the standard regulatory atmospheric diffusion models (discussed in SRP Sections 2.3.4 and 2.3.5) are appropriate for this site.

3. The reviewer evaluates the contents of Section 2.3.2 of the ~~SAR~~safety assessment as follows:

   a. Determine the terrain modifications that will occur as a result of ~~plant~~ construction of a nuclear power plant or plants of specified type that might be constructed on the proposed site, such as removal of trees,

leveling of ground, and installation of lakes and ponds.

b. Determine the location, size, and materials used for ~~plant~~ structures of a nuclear power plant or plants of specified type that might be constructed on the proposed site, including buildings, switchyard gear, parking lots, and roads.

c. Determine and quantify the heat and moisture sources that ~~will~~would be expected to result from ~~plant~~ operations of a nuclear power plant or plants of specified type that might be constructed on the proposed site.

d. Relate the input information in items a, b, and c, above, to local meteorological modifications.

e. Determine air quality conditions used for design and operating basis considerations.

f. Compare the reviewer's assessment with that of the applicant.

4. The reviewer provides the findings on meteorological parameters to the ~~Structural Engineering~~ Mechanical and Civil Engineering Branch and other branches as necessary for review of the adequacy of the design of structures, systems and components important to safety.

IV. EVALUATION FINDINGS

The reviewer verifies that sufficient information has been provided and that his evaluation supports concluding statements of the following type, to be included in the staff's safety evaluation report:

~~The~~ As set forth above, the staff has reviewed available information relative to local meteorological and air quality conditions that are of importance to the safe design and siting of ~~this plant~~ a nuclear power plant of type specified by the applicant and its facilities that might be constructed on the proposed site.

As described above, the applicant has provided and substantiated information on local meteorological and air quality conditions and characteristics, including severe weather phenomena, in accordance with Regulatory Guide 1.70, Section 2.3.2, and in accordance with standard practice as promulgated by the National Oceanic and Atmospheric Administration. In addition, the applicant has met the regulatory positions in Regulatory Guide 1.23 with respect to reporting the onsite meteorological data.

Therefore, the ~~The~~ staff concludes that the identification and consideration of the meteorological, air quality, and topographical characteristics at the site and in the surrounding area are acceptable and meet the requirements of 10 CFR Part 100, §100.~~10(c)(2)~~20(c) and §100.21(d) with respect to determining the acceptability of the site.

The staff also concludes that the identification and consideration by the applicant of the severe local weather phenomena at the site and in the surrounding area are acceptable and meet the requirements of 10 CFR Part 50, Appendix A, General Design Criterion 2, "Design Bases for Protection Against Natural Phenomena," with respect to establishing the design bases for structures, systems, and components important to safety.

~~These conclusions are based on the following:~~

~~(1) The applicant has provided and substantiated information on local meteorological and air quality conditions and characteristics, including severe weather phenomena, in accordance with Regulatory Guide 1.70, Section 2.3.2, and in accordance with standard practice as promulgated by the National Oceanic and Atmospheric Administration; and~~

~~(2) The applicant has met the regulatory positions in Regulatory Guide 1.23 with respect to reporting the onsite meteorological data.~~

These statements will be preceded by a summary of local meteorological and air quality parameters appropriate for the site.

V. IMPLEMENTATION

The following is intended to provide guidance to applicants and licensees regarding the NRC staff's plans for using this SRP section.

This SRP section will be used by the staff when performing safety evaluations of early site permit applications submitted by applicants pursuant to 10 CFR Part 52. Except in those cases in which the applicant proposes an acceptable alternative method for complying with specified portions of the Commission's regulations, the method described herein will be used by the staff in its evaluation of conformance with Commission regulations.

Implementation schedules for conformance to parts of the method discussed herein are contained in the referenced regulatory guides.

VI. REFERENCES

1. 10 CFR Part 50, Appendix A, General Design Criterion 2, "Design Bases for Protection Against Natural Phenomena."

2. 10 CFR Part 100, Subpart B, "Evaluation Factors for Stationary Power Reactor Site Applications on or after January 10, 1997."~~Section 100.10, "Factors to be Considered When Evaluating Sites."~~

3. Regulatory Guide 1.23, "Onsite Meteorological Programs."

4. U.S. Department of Commerce, "State Climatological Summary," ~~Environmental Data Service~~National Climatic Data Center, NOAA, published annually by state.

5. U.S. Department of Commerce, "Local Climatological Data - Annual Summary with Comparative Data," ~~Environmental Data Service~~National Climatic Data Center, NOAA, published annually for all first-order NWS stations.

6. Regulatory Guide 1.70, "Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants."

7. D. H. Slade (ed.), "Meteorology and Atomic Energy - 1968," TID-24190, Division of Technical Information, USAEC (1968).

8. Darryl Randerson (ed.). “Atmospheric Science and Power Production,” DOE/TIC-27601, U.S. Department of Energy (1984).